PATENT ABSTRACTS OF JAPAN

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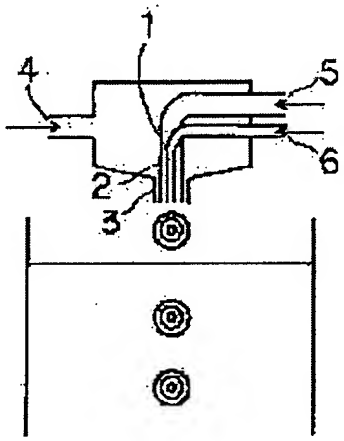
(54) PRODUCTION OF SEAMLESS CAPSULED PARTICLE



(57)Abstract:
PROBLEM TO BE SOLVED: To improve the production yield of emulsion containing seamless capsule by discharging an emulsion containing dispersing elements, of which the average particle diameter is a specified value, from the inside nozzle of multiple nozzles, of which the diameters are successively increased, discharging liquid for film formation from the outside nozzle, forming multilayer liquid drops and hardening them.
SOLUTION: While using the multiple nozzles such as triple nozzles, for example, of which the diameters are successively increased, the liquid for film formation is supplied and discharged to an inlet 4 of an outer-most nozzle 3. An oil component is supplied and discharged from an inlet 5 of an intermediate nozzle 2 and emulsion containing liquid is supplied and discharged from an inlet 6 of an inner-most nozzle 1 respectively so that the multilayer liquid drops can be formed. These drops are hardened into the emulsion containing seamless capsule. The emulsion is formed by dispersing the dispersing element, of which the average particle diameter is smaller than 10μm, into an anionic surface-active agent, etc. A film forming object is not specially limited when it is a material to be hardened or gelled by a means such as cooling.

CLAIMS

[Claim(s)]
[Claim 1]An emulsified matter which contains a surfactant component from at least one nozzle using a multiplex nozzle which has a diameter which increases one by one, In a manufacturing method of joint-less capsule particles which makes a fluid for coat formation of this multilayer drop harden or gel after making a fluid for coat formation breathe out from a nozzle outside a nozzle which pours an emulsified matter and making a multilayer drop form, A manufacturing method of joint-less capsule particles, wherein mean particle diameter of a dispersing element in this emulsified matter is 10 micrometers or less.
[Claim 2]The manufacturing method according to claim 1, wherein mean particle diameter of a dispersing element in this emulsified matter is 1 micrometer or less.
[Claim 3]The manufacturing method according to claim 1 or 2, wherein a coefficient of variation of particle diameter of a dispersing element in this emulsified matter is 80% or less.
[Claim 4]claims 1-3, wherein a surfactant component in this emulsified matter is 0.1 to 25 % of the weight -- either -- a manufacturing method of a statement.
[Claim 5]The manufacturing method according to claim 4, wherein a surface-active agent is a nonionic surfactant.
[Claim 6]claims 1-5, wherein this emulsified matter is an O/W type emulsified matter -- either -- a manufacturing method of a statement.
[Claim 7]claims 1-6, wherein this emulsified matter is what is prepared by a phase inversion emulsification method -- either -- a manufacturing method of a statement.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the manufacturing method of joint-less capsule particles available in the field of drugs, foodstuffs, luxury goods, bath products, a washing article, etc. in more detail about the manufacturing method of the joint-less capsule particles which use an emulsified matter as content fluid.
[0002]
[Description of the Prior Art]Manufacturing the joint-less capsule particles which use an emulsified matter as content fluid is indicated to JP,53-39193,B or JP,6-79165,A.
It is known.
However, before the emulsified matter layer was divided, the coat solution layer was divided, the emulsified matter layer broke through the coat solution layer, and there was a problem that decline in the yield by the target capsule not being generated occurred. In the encapsulation using sclerosing solution, when a surfactant component etc. dissolve or distributed, there was a problem that the situation where interfacial tension with degradation of hydrogenated oil, i.e., the hydrogenated oil, and the coat solution layer of the interfacial tension of sclerosing solution and a coat solution layer declining declines, and encapsulation becomes impossible arose.
[0003]
[Problem(s) to be Solved by the Invention]In the manufacturing method of the joint-less

capsule particles containing an emulsified matter, the method of manufacturing the capsule particles of a multilayer [with sufficient yield] drop with sufficient monodisperse nature is not yet known. In the encapsulation especially using sclerosing solution, since an emulsified matter mixed in sclerosing solution, the description (interfacial tension, purity) of sclerosing solution fell remarkably, it became impossible for a multilayer drop to manufacture regularly and yield fell, development of the manufacturing method of joint-less capsule particles without such a problem was desired. The purpose of this invention is to provide the method of manufacturing the joint-less capsule particles which there is no joint in a coat and contain an emulsified matter this technical problem being solved with sufficient yield.

[0004]

[Means for Solving the Problem]That is, a gist of this invention is (1). A multiplex nozzle which has a diameter which increases one by one is used, After making a fluid for coat formation breathe out from a nozzle outside a nozzle which pours an emulsified matter for an emulsified matter which contains a surfactant component from at least one nozzle and making a multilayer drop form, In a manufacturing method of joint-less capsule particles which make a fluid for coat formation of this multilayer drop harden or gel, A manufacturing method of joint-less capsule particles, wherein mean particle diameter of a dispersing element in this emulsified matter is 10 micrometers or less, (2) A manufacturing method of the aforementioned (1) statement, wherein mean particle diameter of a dispersing element in this emulsified matter is 1 micrometer or less, (3) A manufacturing method the above (1), wherein a coefficient of variation of particle diameter of a dispersing element in this emulsified matter is 80% or less, or given in (2), (4) aforementioned (1) - (3), wherein a surfactant component in this emulsified matter is 0.1 to 25 % of the weight -- either -- a manufacturing method of a statement. (5) a manufacturing method of the aforementioned (4) statement, wherein a surface-active agent is a nonionic surfactant, and (6) aforementioned (1) - (5), wherein this emulsified matter is an O/W type emulsified matter -- either -- a manufacturing method of a statement. (7) aforementioned (1) - (6), wherein this emulsified matter is what is prepared by a phase inversion emulsification method -- either -- it is related, without a manufacturing method of a statement.

[0005]

[Embodiment of the Invention]The fluid for coat formation is made to breathe out from the nozzle outside the innermost nozzle in the manufacturing method of this invention using the multiplex nozzle which has a diameter which increases one by one as mentioned above. Or this fluid for coat formation would not use a coat organizer as melting liquid, it is a solution containing a coat organizer. If this coat organizer is a substance hardened or gelled by chemical means, such as physical means, such as cooling, or crosslinking reaction, it is not limited in particular and can use hydrophilic nature and any oleophilic thing, but. When using as bath products (for example, bath salts), a washing article (for example, body detergent), and drugs, the hydrophilic quantity molecular corpuscle of the high nature of compatibility with water, a semisynthesis, or composition is used preferably.

[0006]As such a hydrophilic quantity molecular corpuscle, for example Glue, gelatin, collagen protein, Casein, sodium alginate, a carrageenan, furcellaran, Tamarind gum, pectin, gum arabic, guar gum, xanthan gum, Natural hydrophilic giant molecules, such as

tragacanth gum, locust bean gum, agar, and starch; Carboxymethyl cellulose, Methyl cellulose, hydroxyethyl cellulose, hydroxypropylcellulose, Cellulose acetate phthalate, propylene glycol alginate, Although synthetic hydrophilic giant molecules, such as semisynthesis hydrophilic-giant-molecules [, such as oxidized starch, esterification starch, etherification starch, and cation starch]; and sodium polyacrylate, polyethyleneimine, polyvinyl alcohol, polyethylene oxide, and a polyvinyl pyrrolidone, etc. are mentioned, It is not limited to these. These hydrophilic quantity molecular corpuscles mix independent or two sorts or more, and are used.

[0007]When using the solution containing a coat organizer as a fluid for coat formation, it is considered as 1 to 50% of the weight of a solution preferably [considering it as 0.1 to 80% of the weight of a solution, using hydrophilic giant molecules as a coat organizer], and more preferably. Water is preferred although not limited especially as a solvent.

[0008]At this time, one sort of water soluble matter or two sorts or more may be added with the above-mentioned hydrophilic quantity molecular corpuscle. When adding water soluble matter, it usually adds ten to 180% of the weight preferably five to 200% of the weight to a coat organizer. It adds ten to 150% of the weight preferably especially ten to 165% of the weight. As water soluble matter added, for example Glycerin, sorbitol, ethylene glycol, A polyethylene glycol, propylene glycol, a polypropylene glycol, An ethyleneoxide propylene oxide copolymer, oligosaccharide, and glyceride. Glucose, galactose, fructose, mannose, mannitol, Although PEG300 of saccharose, malt sugar, lactose, potassium chloride, sodium chloride, a magnesium chloride, magnesium sulfate, and a polyethylene glycol, PEG400, and PEG600 grade are illustrated, it is not limited to in particular these.

[0009]In this invention, an oleophilic coat organizer can be used similarly, For example, polystyrene, polymethylmethacrylate, polybutadiene, A styrene butadiene rubber, a vinyl acetate ethylenic copolymer, a vinylidene chloride acrylonitrile copolymer, Below a styrene acrylate copolymer, ethyl cellulose, and 5 **, independent or two sorts or more can be mixed, and an oily component, waxes, fats and oils, paraffin, thermoplastics, etc. which are solids can be used. It is not limited, especially if it is a good solvent to this coat organizer as a solvent when using the solution containing an oleophilic coat organizer as a fluid for coat formation, and dichloromethane, chloroform, a carbon tetrachloride, benzene, etc. are illustrated.

[0010]Next, the emulsified matter containing the surfactant component used in the manufacturing method of this invention is explained. The surface-active agent used by this invention is chosen from one sort of an anionic surface-active agent, a cationic surface-active agent, a nonionic surfactant, and an ampholytic surface active agent, or two sorts or more. In the case where an inner solution is a use in contact with the skin etc., what is chosen from one sort of a nonionic surfactant with less skin irritation or two sorts or more is preferred after collapse of capsule particles.

[0011]Although not limited especially as an anionic surface-active agent, for example Sodium lauryl sulfate, Lauryl sulfate triethanolamine, lauryl ammonium sulfate, sodium dodecyl benzenesulfonate, Sodium stearate, semi-hardening cow fatty acid sodium, semi-hardening cow fatty acid potassium, Oleic acid potassium, castor oil potassium, alkyl naphthalene sulfonic acid soda, The dialkyl sulfo sodium succinate, alkyl diphenyl ether disulfon acid sodium, Alkyl-phosphoric-acid diethanolamine, alkyl-phosphoric-acid potassium, polyoxyethylene sodium alkylsulfate, polyoxyethylene-alkyl-ether sulfuric

acid triethanolamine, polyoxyethylene-alkyl-phenyl-ether sodium sulfate, etc. are mentioned.

[0012]Although not limited especially as a cationic surface-active agent, for example Lauryl trimethylammonium chloride, Stearyl trimethylammonium chloride, Sept Iles trimethylammonium chloride, Distearyldimethylbenzylammonium chloride, alkylbenzene dimethylannmonium chloride, stearylamine oleate, stearylamine acetate, stearylamine acid, etc. are mentioned.

[0013]Although not limited especially as a nonionic surfactant, for example A glycerine fatty acid ester, Propylene glycol fatty acid ester, a sorbitan fatty acid ester, Polyoxyethylene sorbitan fatty acid ester, propylene fatty acid ester, A glycerine fatty acid ester, sucrose fatty acid ester, polyoxyethylene sorbitol fatty acid ester, Tetraoleic acid polyoxyethylene sorbitol, polyglycerol fatty acid ester, Polyoxyethylene alkyl ether, polyoxypropylene alkyl ether, Polyoxyethylene polyoxypropylene glycol, polyoxyethylene polyoxypropylene alkyl ether, polyethylene glycol fatty acid ester, polyoxyethylene castor oil, polyoxyethylene hydrogenated castor oil, etc. are mentioned. Also in these, since a sorbitan fatty acid ester, polyoxyethylene sorbitan fatty acid ester, and polyoxyethylene sorbitol fatty acid ester have little skin irritation, they are preferred.

[0014]Although not limited especially as an ampholytic surface active agent, for example An alkyl dimethylamino acetic acid betaine, Alkyldimethyl amine oxide, an alkyl carboxymethyl hydroxyethyl imidazolium betaine, lecithin, lauryl aminopropionic acid, an alkyl diaminoethylglycine, etc. are mentioned.

[0015]In order to prepare the emulsified matter containing these surface-active agents, publicly known art is used and it is not limited in particular. For example, an O/W type emulsified matter one sort or two sorts or more of mixtures of an oily component, . [whether an oily component is made to emulsify directly underwater by one sort or two sorts or more of surfactant components chosen from the above anionic surface-active agents, a cationic surface-active agent, a nonionic surface active agent, and an ampholytic surface active agent, and] Or it is obtained from the publicly known art of making an oily component emulsify underwater via the phase inversion from a W/O type emulsified matter to an O/W type emulsified matter etc. A W/O type emulsified matter one sort or two sorts or more of mixtures of an aqueous ingredient, . [whether an aqueous ingredient is made to emulsify directly in an oil by one sort or two sorts or more of surfactant components chosen from the above anionic surface-active agents, a cationic surface-active agent, a nonionic surface active agent, and an ampholytic surface active agent, and] Or it is obtained from the publicly known art of making an aqueous ingredient emulsify in an oil via the phase inversion from an O/W type emulsified matter to a W/O type emulsified matter etc. Although an emulsified matter may also be an O/W type emulsified matter, a W/O type emulsified matter, or a polyphase type emulsified matter, its O/W type emulsified matter is more preferred than stability, such as creaming of an emulsified matter.

[0016]As the emulsification method, especially if the mean particle diameter of the dispersing element in an emulsified matter is set to 10 micrometers or less, will not be limited, but. There are the above-mentioned phase inversion emulsification method, a simultaneous emulsification method, a D-phase emulsification method, a paste process, a self-emulsification method, a phase inversion temperature (HLB temperature) emulsification method, a liquid phase emulsification method, the amino acid gelling

method, an emulsification method using the argillite clathrates, etc., and the publicly known art using various kinds of agitators, a mixer, etc. is used as an emulsification device. Although such combination may be sufficient if needed, the case where the phase inversion emulsification method with which the mean particle diameter of a dispersing element becomes small by uniform distribution comparatively simple is used is preferred.

[0017]Although the concentration in particular of the surfactant component in an emulsified matter is not limited, it is 5 to 15 % of the weight especially preferably five to 20% of the weight more preferably 0.1 to 25% of the weight. The mean particle diameter of a dispersing element does not become it small that the concentration of a surfactant component is less than 0.1 % of the weight, but there is a tendency for the success percentage of the capsule-particles generation in a capsule-particles generate time to fall since the viscosity of an emulsified matter will increase or interfacial tension will decline if larger than 25 % of the weight, and it is not desirable.

[0018]Although the viscosity in particular of an emulsified matter is not limited, its 1000 or less cp is more preferred at 100 ** of solution temperature, or 25 ** than at the ease of carrying out of the division to a drop. If viscosity exceeds 1000cp, since an emulsified matter becomes difficult to be divided and the success percentage of the capsule-particles generation in a capsule-particles generate time falls, it is not desirable.

[0019]In this invention, the viscosity of an emulsified matter can be further reduced by making an organic solvent contain into an emulsified matter, and when especially the concentration of the surfactant component of an emulsified matter is high, the plasticity of the capsule particles in a capsule generate time improves. Although the organic solvent in particular used at this time is not limited, for example Methanol, Monohydric alcohol, such as ethanol, 1-propanol, and 2-propanol. Ethylene glycol, a 1,2-propanediol, 1,3-butanediol, being chosen from ketone, such as dihydric alcohol, such as 1,5-pentanediol, acetone, and methyl ethyl ketone, n-hexane, cyclohexane, toluene, etc. -- these one sort -- or two or more sorts may be mixed and it may use.

[0020]Here, although the organic solvent concentration in particular in an emulsified matter is not limited, it is usually 0.1 to 100 % of the weight preferably 0.01 to 200% of the weight to a continuous phase. There are few effects of the viscosity down of the emulsified matter by addition of an organic solvent if an organic solvent is smaller than 0.01 % of the weight, and since the interfacial tension of an emulsified matter will decline too much and an emulsified matter will become difficult to become spherical if larger than 200 % of the weight, the success percentage of a capsule generate time falls and it is not desirable.

[0021]Although the concentration in particular of the dispersing element in an emulsified matter is not limited, it is 2 to 75 % of the weight usually 5 to 40 % of the weight more preferably three to 50% of the weight. Since a uniform emulsified matter will not be obtained if undesirably smaller than 2 % of the weight in order that the viscosity of an emulsified matter may increase and the plasticity of the capsule particles in a capsule-particles generate time may decrease, if the concentration of a dispersing element is larger than 75 % of the weight, it is not desirable.

[0022]It is important for the mean particle diameter of the dispersing element in an emulsified matter that it is 10 micrometers or less, and it is 0.1 micrometer or less especially preferably 1 micrometer or less still more preferably. 0.1-0.01 micrometer and further 0.1-0.05 micrometer are especially preferred. If the mean particle diameter of a

dispersing element exceeds 10 micrometers, since the opportunity for carrier fluid between dispersing elements not to be divided, but for a dispersing element to also be divided simultaneously may arise when an emulsified matter is divided in a drop, an emulsified matter becomes difficult to be divided and a capsule plasticity may fall.
[0023]Although the coefficient of variation (CV value) in particular of the particle size distribution of the dispersing element in an emulsified matter is not limited, 80% or less is 40% or less especially preferably 60% or less desirable still more preferably. 40 to 1% and further 40 to 5% are especially preferred. If a coefficient of variation exceeds 80%, dispersion in the dispersing element particle diameter in an emulsified matter will become large, There is a case where are it the portion with low viscosity with a large change of the viscosity of the micro portion of an emulsified matter divided easily and the portion with high viscosity which cannot be divided easily, and a capsule plasticity becomes unstable and capsule formation becomes impossible regularly.
[0024]Although the particle diameter of the dispersing element in an emulsified matter and measurement in particular of particle size distribution are not limited, an optical microscope, an electron microscope, laser diffractometry, a laser Doppler method, the coat scattering-about method, a sedimentation method, etc. are mentioned. As for at least 1000 or more particle diameter measurement under a microscope, it is preferably preferred to measure 10000 or more particles. A coefficient of variation (CV value) is calculated with a following formula from standard deviation and mean particle diameter. coefficient-of-variation (%) =(standard deviation/mean particle diameter) x100 -- in addition, any of the number and volume (weight) may be sufficient as the metrics of particle diameter.
[0025]In the manufacturing method of this invention, although various kinds of liquid which serves as contents of capsule particles from other nozzles inside the nozzle which pours the fluid for coat formation is made to breathe out, it is an emulsified matter which contains a surfactant component from at least one nozzle as mentioned above. An oily component and an aqueous ingredient are suitably chosen in the range to which the fluid poured from nozzles other than the nozzle which pours the emulsified matter containing a surfactant component does not interfere with encapsulation. That is, as an ingredient mutually contained in ********, a substantially unmixed (dissolution) ingredient or the ingredient which is hard to mix (dissolution) is suitably chosen as mutual [like an oily component and an aqueous ingredient]. As an aqueous ingredient, water, acetone solution, lower alcohol solution, etc. are used. As an oily component, although the following is mentioned, HLB may contain six or less nonionic surface active agent ingredient.
[0026]Although the oily component in particular used by this invention is not limited, one sort or two sorts or more of mixtures chosen, for example from oil and fat, lows, hydrocarbon, a higher fatty acid group, higher alcohol, ester species, oil refinement, silicone oil, and medium-chain-fatty-acid triglyceride are preferred.
[0027]As oil and fat, for example Soybean oil, a bran oil, jojoba oil, an avocado oil, oil of almonds, Synthetic triglyceride, such as the hydrogenated oil and myristic acid glyceride which are produced by hydrogenating natural oil fat, such as olive oil, cacao oil, sesame oil, a par chic oil, castor oil, palm oil, a mink oil, beef tallow, and lard, or these natural oil fat, and 2-ethylhexanoic acid glyceride, etc. are mentioned. As lows, a carnauba wax, spermaceti wax, yellow bees wax, lanolin, etc. are mentioned, for example. As

hydrocarbon, a liquid paraffin, vaseline, paraffin microcrystallin wax, a ceresin, squalane, pristane, etc. are mentioned, for example. As a higher fatty acid group, lauric acid, myristic acid, pulmitic acid, stearic acid, behenic acid, oleic acid, linolic acid, linolenic acid, lanolin acid, isostearic acid, etc. are mentioned, for example. As higher alcohol, lauryl alcohol, cetyl alcohol, stearyl alcohol, oleyl alcohol, lanolin alcohol, cholesterol, 2-hexyldecanol, etc. are mentioned, for example. As ester species, octanoic acid Sept Iles, lactic acid Millis Chill, lactic acid Sept Iles, myristic acid isopropyl, myristic acid Millis Chill, pulmitic acid isopropyl, adipic acid isopropyl, butyl stearate, oleic acid decyl, etc. are mentioned, for example. As oil refinement, for example Mentha oil, jasmine oil, camphor oil, a cypress oil, Oil of bitter orange, the Lieu oil, spirit of turpentine, cassia and cinnamon oil, a HERUGAMOTTO oil, a mandarin orange oil, A Japanese iris oil, pine oil, lavender oil, bay oil, a clove oil, hiba oil, The attar of rose, eucalyptus oil, lemon oil, peppermint oil, rose oil, sage oil, All [GERA / menthol, cineol, eugenol citral, citronellal, borneol, linalool, and], camphor, Timor, spilantol, pinene, limonene, a TERUPERU system compound, etc. are mentioned. As silicone oil, dimethylpolysiloxane etc. are mentioned, for example. As medium-chain-fatty-acid triglyceride, although Tori caprylic acid glycerin, Tori (caprylic acid capric acid) glycerin, etc. are mentioned, for example, it is not limited to these.

[0028]Although the number in particular of nozzles is not limited in the multiplex nozzle in this invention, when manufacturing joint-less capsule particles, for example by 3-fold nozzle, the combination of the fluid which carries out the regurgitation from each nozzle, Various examples as shown below are given (the discharged liquid of an outermost nozzle / side flow nozzle / innermost nozzle is shown, respectively.).

(1) Hydrophilic film organizer / oily component / O/W type emulsified matter (2) hydrophilic-film organizer / oily component / organic solvent content O/W type emulsified matter (3) oleophilic coat organizer / O/W type emulsified matter / oily component (4) oleophilic coat organizer / organic solvent content O/W type emulsified matter / oily component [0029]Next, the manufacturing method of the joint-less capsule particles by this invention using the above raw material is explained still in detail using drawing 1. Drawing 1 is a sectional view showing typically an example of the nozzle part of the manufacturing installation used for the manufacturing method of this invention. In this invention, although 3-fold nozzle to which the delivery end face is equal is illustrated in this figure, as long as it is a multiplex nozzle which has a diameter which increases one by one, that shape in particular is not limited and each nozzle delivery end face may not gather in this way.

[0030]In the manufacturing method of this invention, the aforementioned fluid for coat formation is supplied from the outermost nozzle inlet 4, for example using such 3-fold nozzle, Supply an oily component from the side flow nozzle entrance 5, supply the fluid containing an emulsified matter from the innermost nozzle inlet 6, each fluid is made to breathe out in the gaseous phase or the liquid phase more nearly continuously than the outermost nozzle 3, the side flow nozzle 2, and the innermost nozzle 1, respectively, and a multilayer drop is made to generate. In this case, especially if it does not mix or dissolve with a coat organizer substantially as the liquid phase, it will not be limited, but the desirable hardening agent or gelling agent like a postscript is good on manufacture. Subsequently, the fluid for coat formation of this multilayer drop is made to harden or gel by a physical or chemical means, and joint-less capsule particles are made to generate.

Although the method etc. which the method of stiffening by making the hardening agent which cooled for example, the fluid for coat formation as a physical means here contact, and cooling, etc. make gel by the chemical reaction of the fluid for coat formation and a hardening agent as a chemical means again are used, If it is the method of making the fluid for coat formation hardening or gelling, it will not be limited to these.

[0031]Especially if a hardening agent is a fluid which hardens or gels the fluid for coat formation by a physical or chemical means, it is not limited, but when making it harden by cooling, the substance which does not have solubility substantially to the fluid for coat formation and the coat organizer produced by hardening is used suitably. To a hydrophilic film organizer, for example, oil and fat, lows, and hydrocarbon, A higher fatty acid group, higher alcohol, ester species, oil refinement, and silicone oil. The oil of one sort or two sorts or more of mixtures chosen from medium-chain-fatty-acid triglyceride is used, and water, methanol, ethanol, 1-propanol, 2-propanol, these mixtures, etc. are used to an oleophilic coat organizer. It will not be limited especially if it is temperature that the fluid for coat formation also hardens cooling temperature.

[0032]When making the fluid for coat formation gel chemically, For example, in the solution and polyvinyl alcohol which contain a calcium chloride and calcium phosphate in sodium alginate. Way sand, formalin, the solution containing chloride, the solution which contains a calcium chloride and a zirconium nitrate with gelatin, etc. are chosen suitably, and gelling arises from the fluids for coat formation and these hardening agents carrying out reactions, such as bridge construction.

[0033]Although each fluid is made to breathe out from a multiplex nozzle as mentioned above and a multilayer drop is made to form, the particle diameter of capsule particles is controllable by the manufacturing method of this invention with all the liquid flow rates, the viscosity of a fluid, the interfacial tension of a fluid, the pitch mentioned later, etc. in this case. If the particle diameter of these capsule particles is decided, it is also possible to control the average thickness of film by flow rate of the flow of the outermost nozzle and the total flow of the other nozzle. It can ask for average thickness-of-film t at this time, for example from the following formula.

[0034]

[Equation 1]

$$t = \frac{D - D_1}{2} = \left(\sqrt[3]{\frac{6}{\pi} (V_2 + V_1)} - \sqrt[3]{\frac{6}{\pi} V_1} \right) \Big/ 2$$

[0035]t: Average thickness of film [cm]

D: Capsule-particles mean particle diameter [cm]

D_1: A diameter of a capsule-particles average inner layer [cm]

V_1: Capsule-particles inner layer volume [cm^3] = $W_1/rho_1=Q_1/IV_2$: capsule-particles coat volume [cm^3] = $W_2/rho_2=Q_2/IW_1$: capsule-particles inner layer weight [g]

W_2: Capsule-particles film weight [g]

Q_1: The total flow of inner layer liquid from a nozzle [cm^3 / min]

Q_2: The total flow of a fluid for coat formation from a nozzle [cm^3 / min]

rho_1: Mean density of inner layer liquid [g/cm^3]

rho_2: Density of a fluid for coat formation [g/cm^3]

I: Capsule-particles generation number [An individual/min]

[0036]In this invention, a rate of a coat which is a wt. ratio of a coat to weight of capsule

particles is 5 to 70 % of the weight usually from the preservation stability of capsule particles 13 to 40 % of the weight still more preferably ten to 50% of the weight preferably. If a rate of a coat is less than 5 % of the weight, it will become easy to collapse at the time of preservation of capsule particles, and collapsibility will become poor if it exceeds 70 % of the weight.

[0037]Although mean particle diameter in particular of capsule particles of this invention is not limited, 0.2 mm - 2 cm are usually preferred, and it is 1 mm - 2 cm preferably from a viewpoint of productivity. When manufacturing capsule particles using a multiplex nozzle, this reason is because production capacity per multiplex nozzle improves, so that mean particle diameter is large. However, mean particle diameter is shown by weighted mean. Although a coefficient of variation in particular of a diameter of capsule particles is not limited, it is desirable from a viewpoint of making uniform dissolving time of a coat in a case of dissolving a capsule, is more desirable, and is desirable. [especially 0 to 10% of] [0 to 15% of] [0 to 20% of]

[0038]Although the average thickness of film in particular of these capsule particles is not limited, ranges of it are usually 0.01 mm - 5 mm, and it is 0.03 mm - 1 mm preferably. When than 5 mm, dissolving a capsule and making contents emit, since great dissolving time is required and success percentage of capsule generation falls remarkably undesirably that a coat organizer collapses easily to a capsule-particles generate time in less than 0.01 mm, it is not desirable. With the average thickness of film said here, it measures by publicly known measuring technique, for example, a micrometer etc.

[0039]In this invention, although each liquid is made to breathe out from each nozzle of a multiplex nozzle as mentioned above and a multilayer drop is made to form, particle diameter of capsule particles, the thickness of film, etc. can be made more uniform by giving vibration to a multilayer liquid column which carries out the regurgitation from a multiplex nozzle in this case. Although a publicly known vibration giving means is used at this time, the technique in particular of giving vibration is not limited, either, and techniques, such as giving an external phase of a multilayer liquid column which gave pulsating flow to a fluid which gives vibration to a nozzle or flows into a nozzle, or was breathed out from a nozzle vibration, are illustrated. It is also possible for pitch given to a multilayer liquid column to be suitably chosen from liquid column linear velocity and fluid viscosity to be used, and to control particle diameter of capsule particles by relation between these, pitch, a discharge flow amount from a nozzle, etc. Although pitch in particular to give is not limited, it is 1-1000 Hz especially preferably 1-2000 Hz preferably 1-3000 Hz in respect of the productivity of capsule particles, and the homogeneity of particle diameter of capsule particles. In less than 1 Hz, vibration is not enough, and if 3000 Hz is exceeded, particle diameter of capsule particles will become uneven. In this invention, a method of not giving vibration but obtaining a drop is also chosen.

[0040]In this invention, it is preferred that the maximum linear velocity is 1.0 to 1.3 times the minimum linear velocity among linear velocity of a fluid breathed out from each nozzle of a multiplex nozzle, and it is 1.0 to 1.05 times still more preferably 1.0 to 1.1 times more preferably. Thus, if a ratio of linear velocity is increased 1.0 to 1.3 times, it will be easy to generate concentric capsule particles, and what has the uniform thickness of film is obtained. In order to manufacture capsule particles containing many content fluid, capsule particles containing many content fluid are stably generable by choosing

each nozzle diameter suitably so that a ratio of linear velocity of a fluid breathed out from each nozzle may become a mentioned range. When manufacturing capsule particles of things with small interfacial tension, it becomes easy to generate capsule particles. On the other hand, when giving vibration to a multilayer liquid column and making capsule particles generate, success percentage of encapsulation becomes high more.

[0041]

[Example]Hereafter, although an example and a comparative example explain this invention in more detail, this invention is not limited at all by these examples. Particle diameter measurement of the dispersing element in an emulsified matter was measured using the laser diffraction / scatter type particle size distribution measuring device LA-910 by Horiba, Ltd. Especially interfacial tension calculated EKISE pearl EH-P by the **** method using water from the W/O emulsified matter from the O/W emulsified matter, unless it set. The poor drop yield performed the sampling for 1 minute, measured the number of defectives of only the capsule in which regular content fluid is not contained, or a coat, and divided it by the number of the whole including a regular capsule. When vibration was given, the number of defectives was divided by number of drop generation = pitch x60 for 1 minute. Viscosity was measured by 25 ** of solution temperature using the Brookfield viscometer.

[0042]15.7 % of the weight of example 1 surface-active agents [Polyoxyethylene (20) sorbitan trioleate, Leo Dole TW-O320(made by Kao Corp.):polyoxyethylene (30) sorbitol tetra oleate, Leo Dole 430(made by Kao Corp.)= 7:3 (wt ratio)] 8.4 % of the weight of oily components Temperature up of [pulmitic acid octyl and EKISE pearl EH-P (made by Kao Corp.)] is carried out to 50 **, It added 75.9 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes to the place stirred at 300 rpm with the poly beaker of 5L 170 mm in inside diameter using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 0.916 micrometer, standard deviation is 0.326 micrometer, and a CV value is 35.6%. Viscosity was 320cp and interfacial tension was 5.0 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 55-Hz vibration by flow 40 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 55.1 ml/min. Tori (caprylic acid capric acid) glycerin which is the sclerosing solution which cooled 30 % of the weight of gelatin, 4 % of the weight of glycerin, and the solution in which it was made to dissolve at 70 ** of 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [KOKONADO MT (made by Kao Corp.)] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was

maintained and carried out. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.
The coefficient of variation of capsule-particles diameter distribution was 5.3%.

[0043]9.41 % of the weight of example 2 surface-active agents [Leo Dole TW-O320(made by Kao Corp.):tetraoleic acid polyoxyethylene sorbitol, Leo Dole 440(made by Kao Corp.)= 9:1 (wt ratio)] 27.88 % of the weight of oily components Carry out temperature up of [EKISE pearl EH-P (made by Kao Corp.)] to 70 **, and with the poly beaker of 5L 170 mm in inside diameter. Every 2 minutes, to the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 62.71 % of the weight of 70 ** ion exchange water [300g of] at a time, phase inversion emulsification was carried out at it, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 0.076 micrometer, standard deviation is 0.017 micrometer, and a CV value is 22.4%. Viscosity was 35cp and interfacial tension was 7.8 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 55-Hz vibration by flow 40 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 55.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.4 mm.
The coefficient of variation of capsule-particles diameter distribution was 4.1%.

[0044]11.7 % of the weight of example 3 surface-active agents [Leo Dole TW-O320(made by Kao Corp.):Leo Dole 430(made by Kao Corp.)= 7:3 (wt ratio)] 8.8 % of the weight of oily components Carry out temperature up of [EKISE pearl EH-P (made by Kao Corp.)] to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. To the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 79.5 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes, and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and was kept at 25 ** for 24 hours, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in

an emulsified matter is 2.535 micrometers, standard deviation is 0.818 micrometer, and a CV value is 32.3%. Viscosity was 30cp and interfacial tension was 6.5 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 55-Hz vibration by flow 40 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 55.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.
The coefficient of variation of capsule-particles diameter distribution was 6.7%.

[0045]1.6 % of the weight of example 4 surface-active agents [Sorbitan sesquioleate, Leo Dole AO-15 (made by Kao Corp.)] 73.3 % of the weight of oily components It emulsified at the place which was mixed with the poly beaker of 5L 170 mm in inside diameter, and has stirred [Tori (caprylic acid capric acid) glycerin] at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height) by adding 25.1 % of the weight of ion exchange water. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 5 minutes at 10000 rpm, and the W/O type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 5.357 micrometers, standard deviation is 3.142 micrometers, and a CV value is 58.7%. Viscosity was 20cp and interfacial tension was 15 dyne/cm. The double nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) 55-Hz vibration is given by flow 40 ml/min from an innermost nozzle with an outermost nozzle diameter of 2.8 mm, KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter and the joint-less capsule particles which have a coat organizer in the outermost layer were manufactured. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The

interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 2.7 mm.
The coefficient of variation of capsule-particles diameter distribution was 8.3%.

[0046]The double nozzle which has a diameter which increases the emulsified matter of example 5 Example 2 one by one (the innermost nozzle diameter of 2 mm) The liquid to which 55-Hz vibration was given by flow 40 ml/min from the innermost nozzle with an outermost nozzle diameter of 2.8 mm and in which fats-and-oils Merano STM was dissolved at 70 ** from the outermost nozzle by flow 22.4 ml/min. Underwater [which is 20 ** sclerosing solution which is flowing by the parallel flow simultaneously] was made to breathe out, an innermost layer is an emulsified matter and the joint-less capsule particles which have a coat organizer in the outermost layer were manufactured. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. Sclerosing solution and KOKONADO MT which carried out the cyclic use of waste water for 5 minutes The interfacial tension [by Kao Corp.] was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 2.7 mm.
The coefficient of variation of capsule-particles diameter distribution was 5.6%.

[0047]17.0 % of the weight of example 6 surface-active agents [Leo Dole TW-O320(made by Kao Corp.):Leo Dole 430(made by Kao Corp.)= 7:3 (wt ratio)] 8.3 % of the weight of oily components Carry out temperature up of [EKISE pearl EH-P (made by Kao Corp.)] to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. To the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 74.7 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes, and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 7.528 micrometers, standard deviation is 2.373 micrometers, and a CV value is 31.5%. Viscosity was 1160cp and interfacial tension was 4.8 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 55-Hz vibration by flow 40 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 55.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for

5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.
The coefficient of variation of capsule-particles diameter distribution was 10.3%.

[0048]15.7 % of the weight of example 7 surface-active agents [Tetraoleic acid POE (60) sorbitol, NIKKOL GO460(product made from Nikko Chemicals):polyoxyethylene stearylether, and emulgen 306P(made by Kao Corp.)=8:2 (wt ratio)] Carry out temperature up of 8.4 % of the weight (octylphthalide) of the oily components to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. To the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 75.9 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes, and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 0.358 micrometer, standard deviation is 0.108 micrometer, and a CV value is 30.2%. Viscosity was 20cp and interfacial tension was 5.5 dyne/cm. The diameter which increases an emulsified matter one by one from the innermost nozzle of 3-fold nozzle (the innermost nozzle diameter of 2 mm, the diameter of a side flow nozzle of 2.8 mm, the outermost nozzle diameter of 3.5 mm) which it has by flow 50 ml/min. EKISE pearl EH-P from a side flow nozzle by flow 28.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 20.8 ml/min from the outermost nozzle at 7 ** which is flowing in sec in 5.3 cm /according to the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 5.7 mm. The coefficient of variation of capsule-particles diameter distribution was 18.2%.

[0049]15.0 % of the weight of example 8 surface-active agents [NIKKOL GO460(product made from Nikko Chemicals):emulgen 306P(made by Kao Corp.)=8:2 (wt ratio)] Carry out temperature up of 8.5 % of the weight (octylphthalide) of the oily components to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. To the

place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 76.5 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes, and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 5.598 micrometers, standard deviation is 19.059 micrometers, and a CV value is 340.5%. Viscosity was 30cp and interfacial tension was 4.8 dyne/cm. The diameter which increases an emulsified matter one by one from the innermost nozzle of 3-fold nozzle (the innermost nozzle diameter of 2 mm, the diameter of a side flow nozzle of 2.8 mm, the outermost nozzle diameter of 3.5 mm) which it has by flow 50 ml/min. EKISE pearl EH-P from a side flow nozzle by flow 28.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 20.8 ml/min from the outermost nozzle at 7 ** which is flowing in sec in 5.3 cm /according to the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 0%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield was maintaining 0%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, 0.02% of the initial moisture content was maintained and carried out. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was maintaining initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.
The coefficient of variation of capsule-particles diameter distribution was 13.7%.

[0050]15.7 % of the weight of comparative example 1 surface-active agents [NIKKOL GO460(product made from Nikko Chemicals):emulgen 306P(made by Kao Corp.)=8:2 (wt ratio)] Carry out temperature up of 8.4 % of the weight (octylphthalide) of the oily components to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. To the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 75.9 % of the weight of 70 ** ion exchange water [300g of] at a time every 2 minutes, and phase inversion emulsification was performed at it. Homomixer[The product made from special opportunity-ized Industry, HV-M] It mixed for 15 minutes at 10000 rpm, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 11.822 micrometers, standard deviation is 11.302 micrometers, and a CV value is 95.6%. Viscosity was 270cp and interfacial tension was 4.2 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 37-Hz vibration by flow 50 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 28.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to

dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 20.8 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 15%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield went up to 40%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, it was increasing to 0.4%. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes was falling to 20 dyne/cm from initial interfacial tension 25 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.
The coefficient of variation of capsule-particles diameter distribution was 20.3%.

[0051]15.7 % of the weight of comparative example 2 surface-active agents [Leo Dole TW-O320(made by Kao Corp.):Leo Dole 430(made by Kao Corp.)= 7:3 (wt ratio)] 8.4 % of the weight of oily components Carry out temperature up of [EKISE pearl EH-P (made by Kao Corp.)] to 50 **, and with the poly beaker of 5L 170 mm in inside diameter. Every 2 minutes, to the place stirred at 300 rpm using three-sheet curve paddle wings (wings 40 mm in radius, and 10 mm in height), it added 75.9 % of the weight of 70 ** ion exchange water [300g of] at a time, phase inversion emulsification was carried out at it, and the O/W type emulsified matter was obtained. The mean particle diameter of the dispersing element in an emulsified matter is 16.790 micrometers, standard deviation is 28.960 micrometers, and a CV value is 172.5%. Viscosity was 1050cp and interfacial tension was 5.2 dyne/cm. 3-fold nozzle which has a diameter which increases an emulsified matter one by one (the innermost nozzle diameter of 2 mm) Give 55-Hz vibration by flow 40 ml/min from a with the diameter of a side flow nozzle of 2.8 mm, and an outermost nozzle diameter of 3.5 mm innermost nozzle, and EKISE pearl EH-P from a side flow nozzle by flow 55.1 ml/min. KOKONADO MT which is the sclerosing solution which cooled the solution in which it was made to dissolve at 70 ** of 30 % of the weight of gelatin, 4 % of the weight of glycerin, and 66 % of the weight of water by flow 22.4 ml/min from the outermost nozzle at 7 ** which is flowing by the parallel flow simultaneously [Kao Corp. make] It was made to breathe out to inside, and an innermost layer is an emulsified matter, and the interlayer consisted of oily components, and manufactured the joint-less capsule particles which have a coat organizer in the outermost layer. The poor drop yield of the drop was 30%. When sclerosing solution was circulated through and used and it encapsulated continuously for 5 minutes, the poor drop yield went up to 50%. When the moisture concentration of the sclerosing solution which carried out the cyclic use of waste water for 5 minutes was measured, it had increased and deteriorated to 0.5%. The interfacial tension of the sclerosing solution and water which carried out the cyclic use of waste water for 5 minutes had declined and deteriorated from initial interfacial tension 25 dyne/cm to 19 dyne/cm. When these capsule particles are dried and particle diameter is measured with slide calipers, mean particle diameter is 3.3 mm.

The coefficient of variation of capsule-particles diameter distribution was 25.4%.

[0052]The above result is shown in Tables 1 and 2.
[0053]
[Table 1]

		実施例				
		1	2	3	4	5
界面活性剤（重量%）		15.7	9.41	11.7	1.6	9.41
油性成分　（重量%）		8.4	27.88	8.8	73.3	27.88
水　　（重量%）		75.9	62.71	79.5	25.1	62.71
転相乳化		○	○	○	×	○
ノズル		3	3	3	2	2
乳化物	平均粒子径（μm）	0.916	0.076	2.535	5.357	0.076
	標準偏差　（μm）	0.326	0.017	0.818	3.142	0.017
	CV値（%）	35.6	22.4	32.3	58.7	22.4
	粘度（cp）	320	35	30	20	35
	界面張力（dyne／cm）	5.0	7.8	6.5	15	7.8
乳化物の型		O／W	O／W	O／W	W／O	O／W
不良液滴生成率（%）		0	0	0	0	0
5分後 不良液滴生成率（%）		0	0	0	0	0
カプセル粒子径（mm）		3.3	3.4	3.3	2.7	2.7
カプセル粒子径変動係数（%）		5.3	4.1	6.7	8.3	5.6
硬化液界面張力（dyne／cm）	前	25	25	25	25	25
	後	25	25	25	25	25

[0054]
[Table 2]

		実施例			比較例	
		6	7	8	1	2
界面活性剤（重量%）		17.0	15.7	15.0	15.7	15.7
油性成分　（重量%）		8.3	8.4	8.5	8.4	8.4
水　　（重量%）		74.7	75.9	76.5	75.9	75.9
転相乳化		○	○	○	○	○
ノズル		3	3	3	3	3
乳化物	平均粒子径（μm）	7.528	0.358	5.598	11.822	16.790
	標準偏差　（μm）	2.373	0.108	19.059	11.302	28.960
	CV値（%）	31.5	30.2	340.5	95.6	172.5
	粘度（cp）	1160	20	30	270	1050
	界面張力（dyne／cm）	4.8	5.5	4.8	4.2	5.2
乳化物の型		O／W	O／W	O／W	O／W	O／W
不良液滴生成率（%）		0	0	0	15	30
5分後 不良液滴生成率（%）		0	0	0	40	50
カプセル粒子径（mm）		3.3	5.7	3.3	3.3	3.3
ｶﾌﾟｾﾙ粒子径変動係数（%）		10.3	18.2	13.7	20.3	25.4
硬化液界面張力（dyne／cm）	前	25	25	25	25	25
	後	25	25	25	20	19

[0055]As shown in Tables 1 and 2, manufacture of the capsule particles where generation of the poor drop was not accepted in Examples 1-8 and which were excellent in monodisperse nature was possible. On the other hand, generation of the poor drop was accepted, decline in yield was caused, and it was not regularly divided by vibration, but the droplet diameter differed in the comparative examples 1 and 2 with the mean particle diameter of greater than 10 micrometers of the dispersing element in an emulsified matter, and the coefficient of variation of the diameter of capsule particles was high.

[0056]

[Effect of the Invention]According to this invention, unlike a conventional method, the manufacturing method of the capsule particles which there is no joint with sufficient yield in a coat, and contain an emulsified matter can be provided.

[Translation done.]